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In 1808 I had a large quantity of this vegetable in full head in the beginning of November. Being at a loss for a shed, or such place as is commonly used for hanging it up, in order to preserve it, I dug a pit along the bottom of a wall, about eighteen inches in depth, and much about the same breadth. On a dry day I pulled up the stocks of colliflower, keeping the leaves as entire as possible, and wrapped them round the flower. I began at one end of the above mentioned pit, laying in my colliflower with the roots uppermost, and the tops inclining downwards, the roots of the one layer covering the tops of the other, and so on with the whole of my stock. The pits were then covered closely up with earth, and beaten smooth with the back of the spade, in order that the rain might run off.

It is to be observed, that the covering had a considerable slope from the wall. The experiment succeeded to my wish; and I was enabled occasionally to give a dish of fine colliflower till the middle of January 1809.

On Mills put in Motion by the re-action of Water, erected by M. Mannoury, Dectot.

(Extracted from a Report made to the Institute at Paris, by Messrs. Perier, Prony, and Carnot.)

The mechanism of these mills is founded on the principle of the re-action of the water on the vessel or reservoir from which it escapes.

The inventor causes the water to enter the mill-wheel at the lower part, along the axle. The column which brings the water, encloses the pivot upon which it turns. This water is brought to the reservoir through a curved canal, by means of which, the mill wheel and the mill which it puts in motion, are placed by the side of the reservoir, and neither above nor below it, which would much injure the working and the simplicity of the machine as we shall shew.

The idea of employing in mechanics the re-action of water as a moving power is not new; however, it does not appear that it has hitherto been practised with the advantage that can be derived from the assistance of a re-acting machine.

M. Mannoury, by bringing the water from below by means of a canal, as we have said, reduces his machine to a simple water-wheel, to the axis of which is immediately fixed the moving mill-stone. Whereas in most of our mills, the wheel that receives the action of the water, acts upon the stone by the intermedium of one or more cogged wheels.

Those of M Mannoury therefore, which do not require a greater fall than our ordinary mills and even less, have a great advantage, in that the mill wheel which receives the action of the water, bears the moving mill-stone immediately upon its axle, which greatly simplifies the machinery, and considerably diminishes the resistance.

Although the water enters with little velocity into the mill-wheel, it causes it to turn very fast, because the apertures for its egress being much smaller than those for its entrance, the velocity at the entrance is reciprocally much smaller than it is at the egress; but this velocity at the egress is not an absolute velocity, for otherwise there would result a spontaneous augmentation of power, which would not agree with the principles of mechanics.

It must be observed that this machine, when it has received its just proportions, acquires of itself, the motion which is necessary for its maximum of effect; for when once the moving force is properly applied to it, the amount of the actual power which it tends to display, can no more annihilate than multiply itself.

By making an analytical calculation of M. Mannoury's machine, we have obtained results remarkable for their simplicity, and the facility of their application; that is to say, the apertures for the entrance and the egress of the water, being proportioned as they ought to be in order to obtain the greatest effect; then,

1. The re-action, that is, the force of pressure which acts upon the mill wheel at each of the apertures of egress, is equal to the weight of a column of water, of the same base as the aperture, and of the height of the level of water in the reservoir.

2. The velocity of the rotation of the mill-wheel to the same point, is to the velocity due to the height of the level of the water in the reservoir, as the aperture for the entrance of the water into the mill-wheel, is to the sum of the apertures of egress.

Whence it follows, by multiplying this force and this velocity, that the effect produced by the machine in a given time, is equal to the weight of all the water that the reservoir can furnish during this time, by the height of the level of the water in the reservoir; now this product, it is well known, is the utmost that can be obtained from the best hydraulic machines.

Finally, M. Mannoury modifies his constructions according to circumstances. He invented the substitution of a wheel with a vertical axle, instead of the one before described to be entirely immersed in the water. This wheel, which is of copper, is three feet in diameter; its circumference is furnished with forty paddles or float boards, of nearly one foot by three inches, very thin, and apart from each other about half an inch. These paddles are all inclined in the same direction on the circumference, and form a sort of circular Venetian blind, in the middle of which is a space where the water is introduced from underneath by a large tube or canal. This wheel, by turning in the water in which it is immersed, meets with no sensible resistance, and answers the purpose as well as the one before described. It is imagined that the water, after having struck upon, or rather pressed only the paddles placed obliquely on the circumference, flies through the small intervals that are left between them.

The advantages of the mills invented by M. Mannoury would furnish us with subject for much interesting detail, into which we cannot enter; we shall confine ourselves to what has appeared to us to be most worthy of remark.

We have said that he introduces the water from underneath, which gives him the facility of placing his machinery at the side of the reservoir, and to avoid connexion by toothed wheels; but this disposition has besides another considerable advantage, which is, that the column of water which enters thus into the wheel, by pressing from below on the part above, with all the weight of the reservoir, sustains a great part of the weight of the machine, and consequently greatly diminishes the friction of the pivot against the socket in which it turns; while on the contrary, when the water enters at the top, as in the old re-acting machines, which is already very heavy of itself, this flowing water considerably augments the weight, and consequently the resistance. We are nevertheless sensible that this disposition cannot take place, except where the bulk of water is not very considerable.

2. It may be asked how M. Mannoury can cause the water to enter the wheel which turns, while the conduit which brings the water is immoveable. We apprehend that he can accomplish this object by causing the pipe that brings the water to enter the collar of the wheel, so as to leave very little play between them, and also by furnishing this small interval with a leather collar; but M. Mannoury has found a more ingenious method, by furnishing the tube at bottom which is fixed, and the moveable collar of the wheel, with several cylindrical and concentrical surfaces which fit one into the other without touching. The water fills the deep and close grooves formed by the cylindrical surfaces, and is sufficient to prevent that which is forced into the wheel from escaping by the sides.

3. One of the operations most difficult to the miller, is to place and maintain his running stone upon its axis, so that it shall turn perfectly horizontal. The least shock deranges it, and then it rubs against the other stone, or it is too tight on one side, while the other is too loose, which makes one part of the grain too fine, and the other too coarse. M. Mannoury has found a simple and expeditious method of giving immediately to the stone its proper situation, by rendering the piece of iron which terminates the axis of this stone, a little convex at the upper part. Hence the equilibrium of the mill-stone on this axis becomes steady, so that it takes of itself the proper position, and if it happen to be a little deranged, it naturally regains its former situation.

4. The author has discovered by multiplied experiments, that the fixed stone should be perfectly flat, instead of being dressed somewhat conically as is customary.

We can suppose indeed that when the fixed stone is dressed conically, if the running stone happens to be ever so little out of its level, the interval between the two stones becomes very irregular, and the grinding is ill performed: as for the running stone, experience proves that it must retain its common form, which is that of a hollow cone, but which is hardly perceptible.

5. The learned Belidor had affirmed in his hydraulic architecture, that to succeed best in the grinding, the furniture of the running stone should be very elastic, because he thought the trembling motion of this stone served to assist in crushing the grain; but it appears certain, from the

experiments of M. Mannoury, that this motion is, on the contrary, very injurious; the firmer the pivot of the axis is fixed, the better is the grinding performed; in this case, the stone becomes in some degree sonorous, and the sort of humming noise that it makes, informs the miller that it is in the most favourable position.

6. Belidor had also affirmed that the heavier the running stone is, the more considerable is its effect. M. Mannoury on the contrary, has found that light stones produce the most effect, but only until they are heated; that then they produce less effect than the heaviest stones, because the latter heat more slowly; this is expressed by the millers when they say that the mill is tired and wants rest, that is, it must have time to cool.

7. M Mannoury made in the presence of the commissioners, a course of experiments, to ascertain the effect of the reacting machines that he employs in his mills. These experiments offer a series of facts, very useful to be known in practice. We have particularly remarked an ingenious expedient employed by the inventor, in order to render uniform the action of a variable power, such as the power of a man applied to a windlass, who is not always capable of employing the same degree of force and swiftness.

All these particulars are valuable, because they are the result of experiments made upon the principle of profiting by every little circumstance, without blindly following the common routine established by custom.

We think that the mills of M. Mannoury exhibit a happy application of the re-acting power of water, which for their simplicity and useful effects, merit to be often employed instead of the common mills, and that his researches are worthy of the approbation of the class.

Account of a Stone-Coloured Paint. By M. Carbonel.

(From the Annales des Arts et Manufactures.)

M. Carbonel having announced that by employing the serum of beefs blood, a stone coloured paint could be obtained capable of resisting the vicissitudes of the weather, and that it had perfectly succeeded in Spain, M. Guyton Morveau examined this process and the following are the results of his experiments.

The serum of the blood decanted three or four hours after it is collected, applied to soft stone, gives it a yellowish tinge. It resists water when it is very dry. It does not adhere to hard stone. The serum mixed with chalk stains the fingers, but it is washed off by water.

If a coat of the serum be laid on a soft stone, and if before it be dry some lime-water be added rather thick, a white colour remains which covers it thinly, but which resists water. The serum mixed with quick lime, and passed through a sieve, according to the author's process, forms a paste which, diluted with the same mordant and laid on directly, covers the stone with tolerable equality, and gives to it a colour more or less yellow according as the colouring parts remain more or less in the serum. It often requires two coats, and sometimes a third.

This paint is not injured either by friction, or by washing with water.

When applied upon pasteboard, it does not dissolve with water, but it does not adhere so well as the composition called *Bachelier*.

M. Carbonel anticipated, that this composition could not be coloured by the metallic oxyds, not even by those of lead and copper, which is obtained with the red, yellow, and green earths, &c. M. Guyton endeavoured to substitute the serum for the paste in the composition called *Bacheleir*, and he discovered that its adherence was nearly as strong; but that on washing it with water, some yellowish traces were left, produced by a commencement of the disoxydation of the lead.

The solidity of this colour depends upon the state in which the serum is taken. This subtance corrupts with so much facility, that it must be used the same day, or at the latest within twenty-four hours, and no more prepared than can be used directly. As soon as the putrid odour begins to manifest itself, the paint produced comes off in scales, or powder.

Thus we see that with proper care the serum, although it gives a mordant more difficult to use, and of less body than the old paints (which is no doubt owing to the quantity of gelatine it contains) may, by uniting it with quick lime, be made to form a paint that resists water.

This composition has been long used in China, where before they varnish wood they sometimes give a first coat of quick